CLAIMS

1. A dispersion slope compensating optical waveguide having a negative dispersion slope, the waveguide comprising:

a core region; and

a clad layer;

wherein the core region comprises a first region and a second region, the second region surrounding the first region and having a width sufficient to confine electromagnetic radiation within a selected wavelength range to substantially only the core region,

wherein the negative dispersion slope of the waveguide is in the range of -2 ps/nm^2-km to -40 ps/nm^2-km over the selected wavelength range.

2. The dispersion slope compensating optical waveguide of claim 1, wherein the negative dispersion slope is in the range of -5 ps/nm^2-km to -26 ps/nm^2-km over the selected wavelength range.

3. The dispersion slope compensating optical waveguide of claim 1, wherein the selected wavelength range includes 1550 nm.

4. The dispersion slope compensating optical waveguide of claim 3, wherein the selected wavelength range is about 1450 nm to 1700 nm.

5. The dispersion slope compensating optical waveguide of claim 3, wherein the selected wavelength range is about 1470 nm to 1640 nm.

6. The dispersion slope compensating optical waveguide of claim 1, wherein the core has a central axis and each of the first region and the second region has an axis collinear with the central axis.

7. The dispersion slope compensating optical waveguide of claim 6, wherein the second region has an inner radius and an outer radius and the difference therebetween is in the range of about 6 to about 20 microns.

8. The dispersion slope compensating optical waveguide of claim 6, wherein the second region has a relative index $\Delta_2\%$, and the first region comprises:

a central segment having an outer radius, an axis collinear with the central axis, and a relative index $\Delta_c\%$ of a same sign as the second region relative index $\Delta_2\%$; and

a moat segment surrounding the central segment and having an outer radius, an inner radius, an axis collinear with the central axis, and a relative index $\Delta_m\%$ that is opposite in sign to the central segment relative index $\Delta_c\%$.

9. A dispersion slope compensating optical waveguide having a negative dispersion slope, the waveguide comprising:

a core region having a central axis; and

a clad layer;

wherein the core region comprises, a central segment, a moat segment, and a ring segment, each segment having an outer radius and an axis collinear with the central axis, the moat and ring segments each having an inner radius,

the central segment located about the central axis and having a relative index $\Delta_c\%$;

the moat segment located about the central segment and having a relative index $\Delta_m\%$ opposite in sign to the relative index $\Delta_c\%$ of the central segment;

the ring segment located about the moat segment and having a relative index $\Delta_r\%$ of the same sign as the relative index $\Delta_c\%$ of the central segment, the difference between the ring segment outer radius and the ring segment inner radius being sufficient to confine electromagnetic radiation within a selected wavelength range to substantially only the core region,

the negative dispersion slope being in the range of -2 ps/nm^2-km to -40 ps/nm^2-km over the selected wavelength range.

10. The dispersion slope compensating optical waveguide of claim 9, wherein the difference between the ring segment outer radius and the ring segment inner radius is in the range of about 6 to about 20 microns.

11. The dispersion slope compensating optical waveguide of claim 9, wherein each of the central, moat and ring segments has a respective refractive index profile, the refractive index profiles having a respective shape selected from the group consisting of an α-profile, a step, a rounded step, a trapezoid, and a rounded trapezoid.

12. The dispersion slope compensating optical waveguide of claim 11, wherein the respective refractive index profiles of the central and moat segments are α-profiles with an α value of about 4.

13. The dispersion slope compensating optical waveguide of claim 9, wherein the negative dispersion slope is in the range of -5 ps/nm^2-km to -26 ps/nm^2-km over the selected wavelength range.

14. The dispersion slope compensating optical waveguide of claim 9, wherein

the central segment has a relative index Δ_c% in the range of about 0.4% to 0.8%;

the moat segment has a relative index Δ_m% in the range of about -0.5% to -0.7%; and

the ring segment has a relative index Δ_r% in the range of about 0.1% to 0.4%, the ring segment inner radius being in the range of about 6.5 microns to 12.5 microns, the difference between the ring segment outer radius and the ring segment inner radius being in the range of about 2 to about 20 microns.

15. The dispersion compensating optical waveguide of claim 9, wherein the selected wavelength range includes 1550 nm.

16. The dispersion slope compensating optical waveguide of claim 15, wherein the selected wavelength range is about 1450 nm to 1700 nm.

17. The dispersion slope compensating optical waveguide of claim 14, wherein the difference between the ring segment outer radius and the ring segment inner radius is in the range of about 6 to 20 microns.

18. The dispersion slope compensating optical waveguide of claim 14, wherein the central segment outer radius is in the range of about 3 to 6 microns.

19. The dispersion slope compensating optical waveguide of claim 14, wherein the difference between the moat segment outer and inner radius is in the range of about 3.5 microns to 6.5 microns.

20. The dispersion slope compensating optical waveguide of claim 14, wherein the central segment outer radius is about 4 microns, the moat segment outer radius is about 8 microns, and the ring segment outer radius is about 18 microns.

21. The dispersion slope compensating optical waveguide of claim 20, wherein the central segment has a relative index $\Delta_c\%$ of about 0.6%, the moat segment has a relative index $\Delta_m\%$ of about -0.55%, and ring segment has a relative index $\Delta_r\%$ of about 0.3%.

22. The dispersion slope compensating optical waveguide of claim 14, wherein the central segment outer radius is about 4 microns, the moat segment outer radius is about 10 microns, and the ring segment outer radius is about 14 microns.

23. The dispersion slope compensating optical waveguide of claim 22, wherein the central segment has a relative index $\Delta_c\%$ of about 0.6%, the moat segment has a relative index $\Delta_m\%$ of about -0.55%, and ring segment has a relative index $\Delta_r\%$ of about 0.4%.

24. The dispersion slope compensating optical waveguide of claim 14, wherein the central segment outer radius is about 4 microns, the moat segment outer radius is about 9 microns, and the ring segment outer radius is about 22 microns.

25. The dispersion slope compensating optical waveguide of claim 24, wherein the central segment has a relative index $\Delta_c\%$ of about 0.6%, the moat segment has a relative index $\Delta_m\%$ of about -0.55%, and ring segment has a relative index $\Delta_r\%$ of about 0.3%.

26. A dual optical waveguide, comprising:

a dispersion compensating optical waveguide; and

a dispersion slope compensating optical waveguide arranged in series with and optically coupled to the dispersion compensating optical waveguide, the dispersion slope compensating waveguide comprising:

a core region having a central axis; and

a clad layer;

wherein the core region comprises, a central segment, a moat segment, and a ring segment, each segment having an outer radius and an axis collinear with the central axis, the moat and ring segments each having an inner radius,

the central segment located about the central axis and having a relative index $\Delta_c\%$;

the moat segment located about the central segment and having a relative index $\Delta_m\%$ opposite in sign to the relative index $\Delta_c\%$ of the central segment;

the ring segment located about the moat segment and having a relative index $\Delta_r\%$ of the same sign as the relative index $\Delta_c\%$ of the central segment, the difference between the ring segment outer radius and the ring segment inner radius being sufficient to confine electromagnetic radiation in a selected wavelength range to substantially only the core region,

the negative dispersion slope being in the range of -2 ps/nm^2-km to -40 ps/nm^2-km over the selected wavelength range.

27. An optical waveguide span comprising:

a transmission waveguide;

a dispersion compensating optical waveguide arranged in series with and optically coupled to the transmission waveguide; and

a dispersion slope compensating optical waveguide arranged in series with and optically coupled to the dispersion compensating optical waveguide, the dispersion slope compensating waveguide comprising:

a core region having a central axis; and

a clad layer;

wherein the core region comprises, a central segment, a moat segment, and a ring segment, each segment having an outer radius and an axis collinear with the central axis, the moat and ring segments each having an inner radius,

the central segment located about the central axis and having a relative index $\Delta_c\%$;

the moat segment located about the central segment and having a relative index $\Delta_m\%$ opposite in sign to the relative index $\Delta_c\%$ of the central segment;

the ring segment located about the moat segment and having a relative index $\Delta_r\%$ of the same sign as the relative index $\Delta_c\%$ of the central segment, the difference between the ring segment outer radius and the ring segment inner radius being sufficient to confine electromagnetic radiation in a selected wavelength range to substantially only the core region,

the negative dispersion slope being in the range of -2 ps/nm^2-km to -40 ps/nm^2-km over the selected wavelength range.

28. The optical waveguide span of claim 27, wherein the transmission waveguide is a large effective area fiber.

29. A optical transmission system transmitting in a selected wavelength range including 1550 nm, the system comprising:

a transmission waveguide;

a dispersion compensating optical waveguide arranged in series with and optically coupled to the transmission waveguide; and

a dispersion slope compensating optical waveguide arranged in series with and optically coupled to the dispersion compensating optical waveguide;

a transmitter optically coupled to the transmission waveguide, wherein the transmitter launches an optical signal into the transmission waveguide in the selected wavelength range; and

a receiver optically coupled to the dispersion slope compensating waveguide, wherein the receiver receives the optical signal from the dispersion slope compensating optical waveguide;

wherein the dispersion slope compensating optical waveguide comprises:

a core region having a central axis; and

a clad layer;

wherein the core region comprises, a central segment, a moat segment, and a ring segment, each segment having an outer radius and an axis collinear with the central axis, the moat and ring segments each having an inner radius,

the central segment located about the central axis and having a relative index Δ_c%;

the moat segment located about the central segment and having a relative index Δ_m% opposite in sign to the relative index Δ_c% of the central segment;

the ring segment located about the moat segment and having a relative index Δ_r% of the same sign as the relative index Δ_c% of the central segment, the difference between the ring segment outer radius and the ring segment inner radius being sufficient to confine electromagnetic radiation in a selected wavelength range to substantially only the core region,

the negative dispersion slope being in the range of -2 ps/nm^2-km to -40 ps/nm^2-km over the selected wavelength range.

30. The optical transmission system of claim 29, wherein the transmitter launches the optical signal directly into the transmission waveguide.

31. The optical transmission system of claim 29, wherein the receiver receives the optical signal directly from the dispersion slope compensating optical waveguide.